Project B-209

ENGINE ELECTRICAL EQUIPMENT

A Manufacturing Opportunity in Georgia

Prepared for

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Summary

A Georgia manufacturer of engine electric equipment for the replacement market can, with only a 5% penetration of the southeastern market, produce $3 million worth of finished product annually at a cost saving of between $148,000 and $298,000 over the cost for northern plants.

In 1962 the replacement market for engine electrical equipment in the six southeastern states was $61 million.[1/] It is estimated that this market will expand to $74 million in 1970.

This sectional growth potential is similar to that of the total national engine electrical equipment industry, which is expected to surpass $1 billion by 1970.

Since there are no major producers of these automotive parts in the Southeast, a Georgia manufacturer of engine electrical equipment selling to the southeastern market can become most competitive by utilizing the following advantages:

1. Reduced Labor Costs. A manufacturer in the South can produce $3 million worth of engine electrical equipment at a production labor cost of $135,000 to $268,000 less than that of a company located in the Middle Atlantic, New England, or East North Central regions.
2. Lower Freight Costs. Engine electrical equipment worth $3 million can be shipped from Atlanta to customers in the Southeast with freight savings of $9,000 to $39,000 over existing northern plants.

To supplement these monetary benefits, Georgia also can offer:

1. A low work stoppage record.
2. Reduction in delivery time and greater product availability due to a central position in the southeastern market. A Georgia plant would benefit further from proximity to Atlanta, which is by far the largest wholesaling point in the Southeast.

1/ Alabama, Florida, Georgia, North Carolina, South Carolina, and Tennessee.

INTRODUCTION

Electrical equipment for internal combustion engines is classified by the U. S. Department of Commerce as part of "Miscellaneous Electrical Machinery, Equipment, and Supplies." Specific products are:

1. Starting motors and generators for motor vehicles.
2. Ignition apparatus for internal combustion engines (coils, distributors, magnetos, and spark plugs).

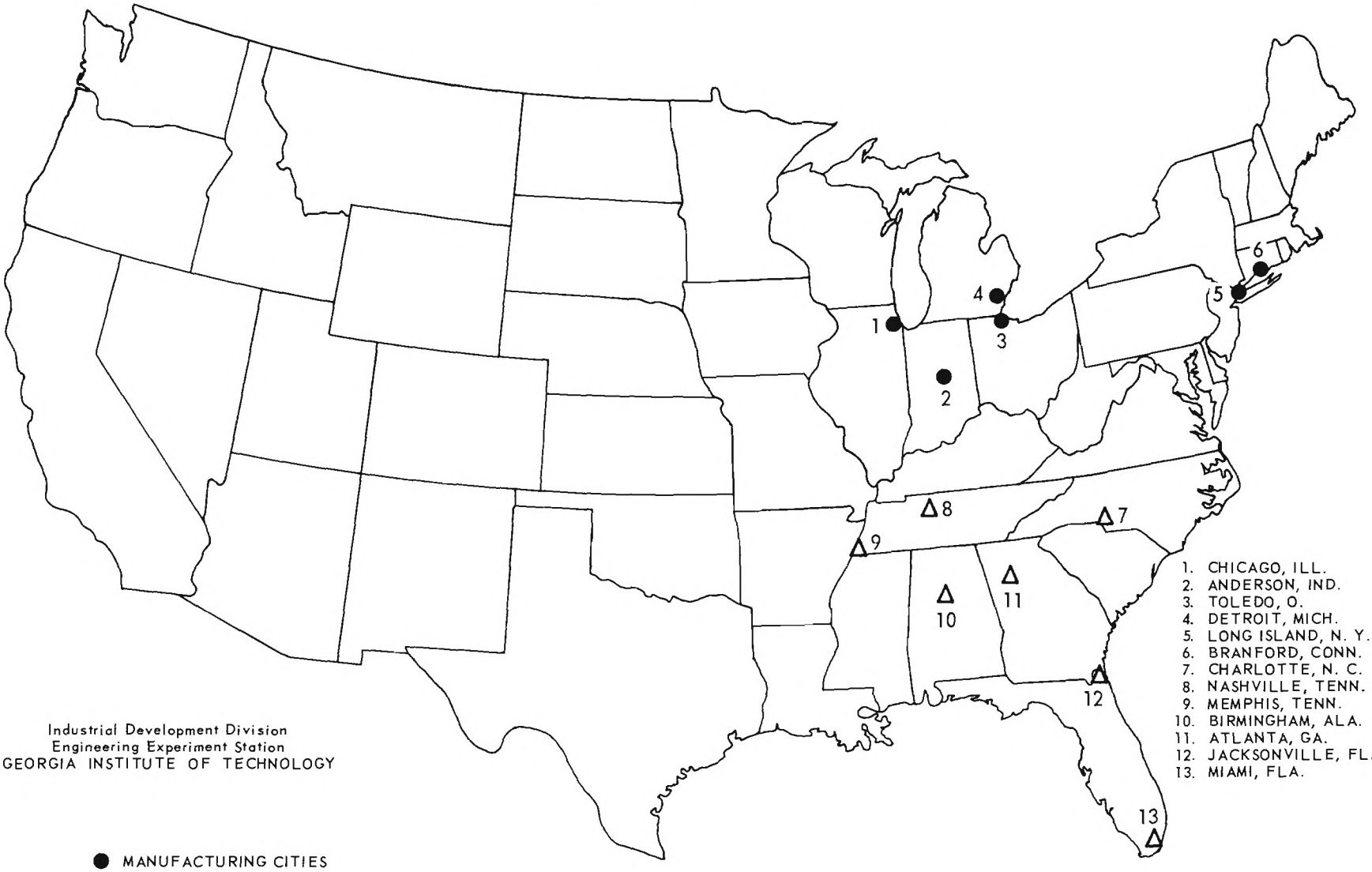
The manufacture of engine electrical equipment is well suited for large-plant production. In 1958, production at 51 plants, each employing at least 100 workers, was valued at $589 million, or over 93% of the total value of shipments for the industry. None of these 51 manufacturing operations are located in the Southeast.

Production labor in these large plants consists of semi-skilled workers with machine shop and metal fabricating capabilities.

A sizable portion of the engine electrical equipment consumed in the southeastern area is shipped from six cities in the Northeast and Midwest to seven cities in the Southeast. (See Map 1.)

The distribution of these electrical automotive parts is accomplished through automotive equipment wholesalers, the service departments of new car dealers, chain stores, and mail-order houses. Freight costs on shipments exceeding a minimum weight or value are prepaid by the manufacturer.

MAP 1
PRINCIPAL MANUFACTURING CITIES AND PRINCIPAL WHOLESALING CITIES
FOR ENGINE ELECTRICAL EQUIPMENT CONSUMED IN THE SOUTHEAST



THE MARKETS

National Market

The 1962 value of shipments of electrical equipment for internal combustion engines in the U. S. was almost $850 million.[1/] This is a $397 million increase over the 1950 figure of $453 million. By using 1950, 1962, and the intervening years as a basis for a first-degree projection, a national market of $1,026 million can be estimated for 1970. (See Figure 1.)

From discussions with numerous automotive parts associations and manufacturers, it is estimated that 60% of the engine electrical equipment produced in the U. S. is used for replacement purposes.[2/] This would indicate a national market of $510 million for replacement engine electrical equipment in 1962. This market should expand to $615 million in 1970.

There has been speculation that the long warranties on the newer cars will tend to increase the number of older cars on the road, but improved electrical systems may very well cancel out the resulting increased sales potential.

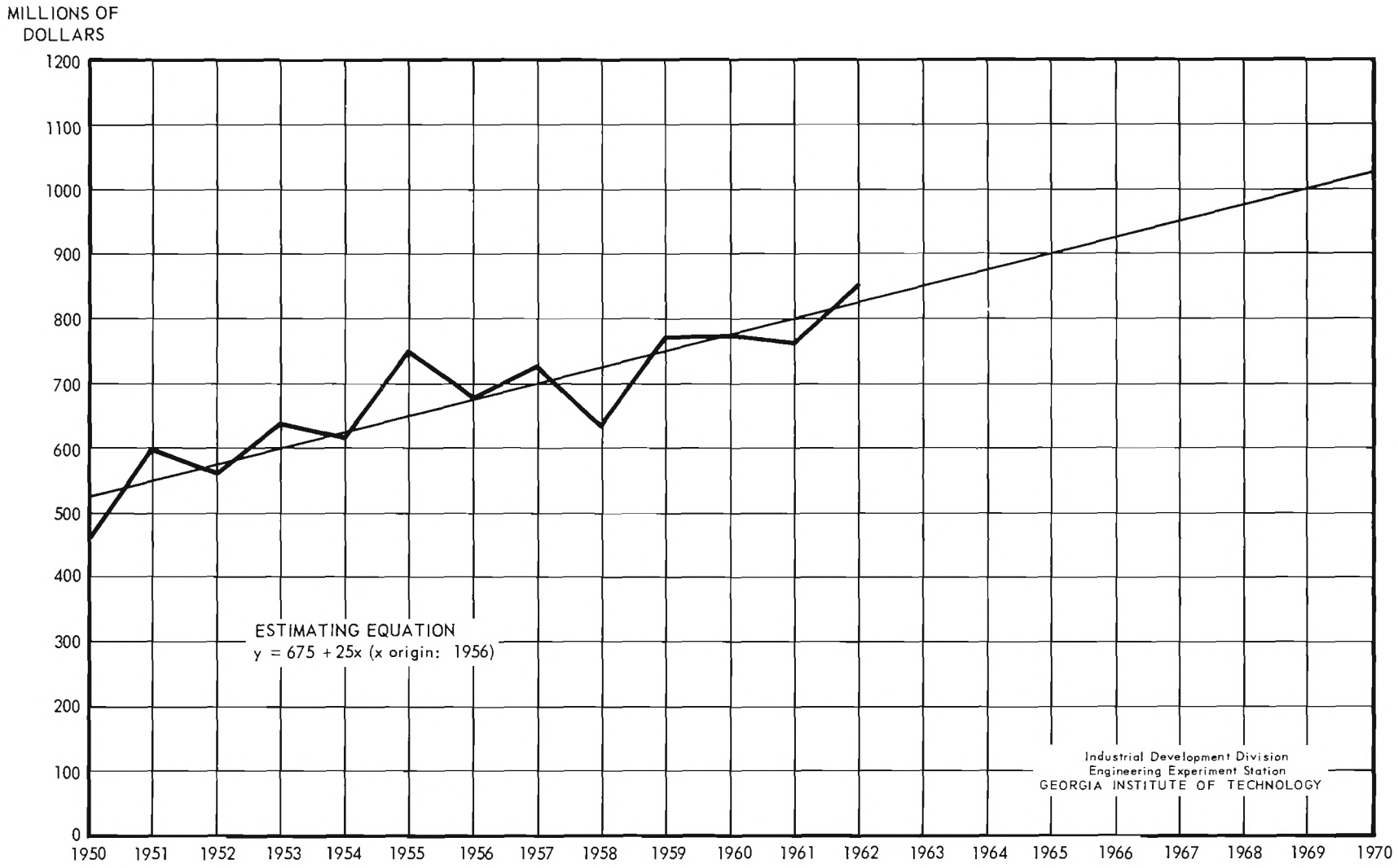
There were 32 million automobiles more than three years old registered in the U. S. in 1954. The number increased gradually each year to 44 million in 1962. From a straight-line projection formed by registrations for these nine years, a national registration of 58 million cars more than three years old can be forecast for 1970. (See Figure 2.)

Since a sound electrical system is essential for the continuous efficient performance of motor vehicles, the existence of a high coefficient of correlation (0.93) between the value of shipments of engine electrical equipment and registered automobiles more than three years old seems understandable. (See Appendix 1.) This correlation is useful in determining the southeastern market for replacement engine electrical equipment.

1/ U. S. Bureau of the Census, Annual Survey of Manufactures, 1962.

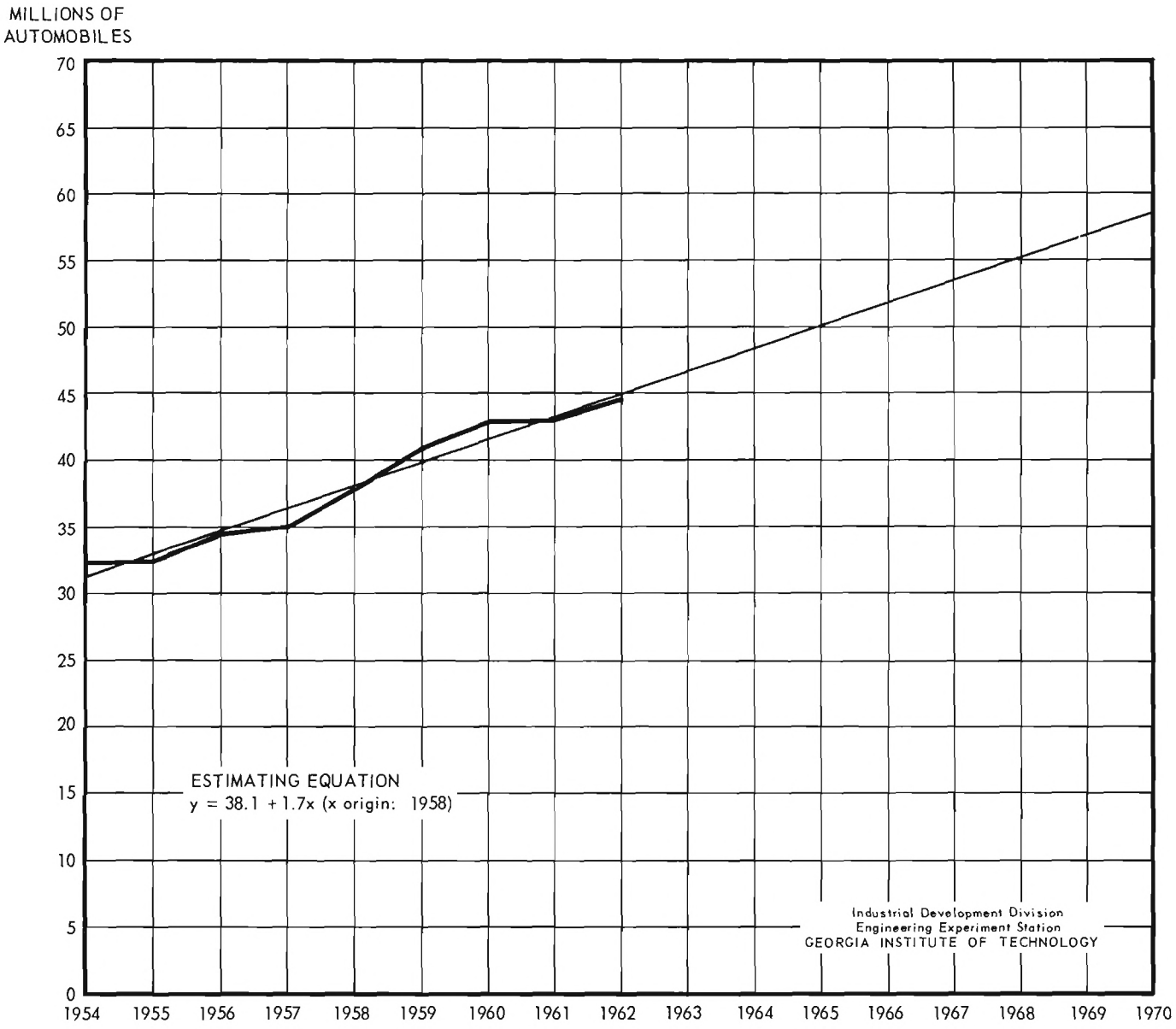
2/ This percentage does not hold for any particular year, since production of cars and trucks, which may vary considerably from year to year, determines the market for original equipment.

FIGURE 1
SALES TREND OF ENGINE ELECTRICAL EQUIPMENT



SOURCE: U. S. Bureau of the Census, Annual Survey of Manufactures, 1950–1962.

FIGURE 2
MOTOR VEHICLE REGISTRATIONS OF AUTOMBILES MORE THAN THREE YEARS OLD



SOURCE: Automotive Industries, Statistical Issues, 1955–1963

Southeastern Market[1/]

Consumption. The Southeast's share of registered automobiles more than three years old for some years has held close to 12% of the national registrations of similarly aged cars. (See Table 1.)

Table 1

COMPARISON OF REGISTERED MOTOR VEHICLES
MORE THAN THREE YEARS OLD
IN THE SOUTHEAST AND THE U. S.

Year	Number of Vehicles Registered (in thousands)		Southeastern Percentage of U. S.
	Southeast	U. S.	
1954	3,452	32,267	10.7
1955	3,532	32,405	10.9
1956	3,816	34,460	11.1
1957	4,005	35,130	11.4
1958	4,376	37,730	11.6
1959	4,806	40,834	11.8
1960	5,073	42,750	11.9
1961	5,108	42,880	11.9
1962	5,310	44,446	11.9

Source: Automotive Industries, Statistical Issues, 1955-1963

In view of the high correlation between engine electrical equipment sales and registrations of automobiles more than three years old, it can be assumed that approximately 12% of the replacement engine electrical equipment produced in the U. S. is consumed in the Southeast. Based on this assumption, the southeastern market for replacement engine electrical equipment was approximately $61 million in 1962, and the regional market should expand to almost $74 million by 1970.

1/ Alabama, Florida, Georgia, North Carolina, South Carolina, and Tennessee.

Wholesale Sales. Engine electrical equipment is usually distributed through automotive equipment wholesalers. In 1958 the wholesale sales for automotive equipment (all types of operations) in the Southeast were $593.2 million. Of these sales, 13.3% was wholesaled in Atlanta[1/] and over 51% was confined to seven cities. The automotive equipment wholesale sales for these cities, with comparative percentages, are listed in Table 2.

Table 2

WHOLESALE SALES OF AUTOMOTIVE EQUIPMENT
IN PRINCIPAL DISTRIBUTION CITIES IN THE SOUTHEAST
(1958)

City	Wholesale Sales (in millions of dollars)	Percentage of Sales in Seven Cities
Atlanta, Ga.	78.9	26
Jacksonville, Fla.	46.6	15
Memphis, Tenn.	43.1	14
Charlotte, N. C.	38.0	13
Birmingham, Ala.	35.8	12
Nashville, Tenn.	31.6	10
Miami, Fla.	29.4	10
	303.4	100

Source: U. S. Bureau of the Census, 1958 Census of Business -- Wholesale Trade

Since Atlanta has 70% more wholesale sales than the next largest wholesale point in the Southeast, Georgia is a logical location for a market-oriented plant.

1/ In addition to being the leading southeastern wholesale city for automotive equipment, Atlanta also had wholesale sales of electric equipment amounting to over $263 million, more than any state in the Southeast other than Georgia.

ADVANTAGES OF A GEORGIA LOCATION

Lower Labor Costs

In 1958 the cost of production labor used to manufacture engine electrical equipment in the United States was over $140 million, or 22.3% of the value of shipments. The production wage rate for engine electrical equipment is considerably lower in the South than in the New England, Middle Atlantic, or East North Central regions. In 1958 the wage rates for these products were:[1/]

East North Central	$2.51
New England	2.05
Middle Atlantic	1.88
South	1.50

The above differences would signify that the South can offer the following percentage reductions in labor costs over these areas:

East North Central	40.2%
New England	26.8%
Middle Atlantic	20.2%

A Georgia producer of engine electrical equipment with annual sales of $3 million can realize large labor cost reductions over manufacturers in other regions of the U. S. The labor cost savings of a Georgia manufacturer can be roughly estimated by multiplying the average production wage percentage of the value of shipments in the U. S. by the annual sales volume and then by the South's labor savings percentage over each region as follows:

East North Central	0.223	x	$3,000,000	x	0.402	=	$268,938
New England	0.223	x	$3,000,000	x	0.268	=	$179,292
Middle Atlantic	0.223	x	$3,000,000	x	0.202	=	$135,138

Lower Work Stoppage Rate

In 1962 Georgia had one of the lowest work stoppage percentages in the U. S.[2/] The ratio of work stoppage to total working time was 62% less in Georgia than in Connecticut, 56% less than in New York, and 38% to 71% less than in midwestern states with automotive electrical manufacturing facilities.

1/ U. S. Bureau of the Census, U. S. Census of Manufactures, 1958.

2/ U. S. Department of Labor, Monthly Labor Review, July 1963.

In addition, metalworking companies with multiplant operations throughout the country indicate that absenteeism caused by inclement weather is minimal in the Georgia plants.

Freight Savings

The freight rates for engine electrical equipment from an Atlanta plant to the southeastern cities leading in automotive equipment wholesale sales are less than from any manufacturer shipping to the same cities from outside the Southeast. Actual freight rates from cities with plants presently supplying the area and from Atlanta, along with average freight rates to the Southeast from each of these cities, are shown in Appendix 2.

An engine electrical equipment manufacturer selling to the southeastern market can cut his freight cost between 45% (over Anderson, Indiana) and 59% (over Branford, Connecticut) by shipping from Atlanta rather than from any of the principal supply points in the North.

Two separate sets of calculations are necessary in estimating the shipping costs of engine electrical equipment because there is a wide range of value per pound for these products. These values average $1.00 per pound for heavy products and $2.50 per pound for light electrical equipment.

The annual freight cost for a manufacturer producing $3 million worth of heavy, bulky items (generators and transformers) for the southeastern market is shown in Table 3.

Table 3

FREIGHT COSTS FOR SHIPPING HEAVY ENGINE ELECTRICAL EQUIPMENT TO THE SOUTHEAST

City	Average Freight Rates (per 100 lbs.)		No. of Truckloads		Size of Truckload (in 100 lbs.)		Annual Freight Cost
Branford, Conn.	$2.24	x	135	x	220	=	$66,528
Long Island, N. Y.	1.98	x	135	x	220	=	58,806
Chicago, Ill.	1.89	x	135	x	220	=	56,133
Detroit, Mich.	1.89	x	135	x	220	=	56,133
Toledo, Ohio	1.85	x	135	x	220	=	54,945
Anderson, Ind.	1.66	x	135	x	220	=	49,302
Atlanta, Ga.	.91	x	135	x	220	=	27,027

For light engine electrical equipment (ignition parts) the freight rates and truckload weight requirements would be the same, but the number of truckloads necessary to deliver $3 million worth of merchandise would be less. Consequently freight costs would be lower.

Table 4

FREIGHT COSTS FOR SHIPPING LIGHT ENGINE ELECTRICAL EQUIPMENT TO THE SOUTHEAST

City	Average Freight Rates (per 100 lbs.)		No. of Truckloads		Size of Truckload (in 100 lbs.)		Annual Freight Cost
Branford, Conn.	$2.24	x	55	x	220	=	$27,104
Long Island, N. Y.	1.98	x	55	x	220	=	23,958
Chicago, Ill.	1.89	x	55	x	220	=	22,869
Detroit, Mich.	1.89	x	55	x	220	=	22,869
Toledo, Ohio	1.85	x	55	x	220	=	22,385
Anderson, Ind.	1.66	x	55	x	220	=	20,086
Atlanta, Ga.	.91	x	55	x	220	=	11,011

Annual freight savings available to a Georgia manufacturer of engine electrical equipment with $3 million of sales over present suppliers to the southeastern region are as follows:

Atlanta over	Branford	$16,093 to $39,501
	Long Island	12,947 to 31,779
	Chicago	11,858 to 29,106
	Detroit	11,858 to 29,106
	Toledo	11,374 to 27,918
	Anderson	9,075 to 22,275

Proximity to Market

More than 13% of all the automotive equipment distributed in the Southeast is handled through wholesalers in Atlanta. A Georgia manufacturer of engine electrical equipment would enjoy proximity to these customers and at the same time be centrally located in the market area. From this position a producer can offer first-morning delivery service to distributors in almost the entire southeastern region. This is one or two days faster than any of the present suppliers can ship to the same wholesalers.

An automotive equipment wholesaler can more readily be induced to promote electrical equipment brands manufactured in the Southeast because product availability will reduce inventory requirements of the slower-moving items.

Raw Materials

The principal raw materials used in the production of engine electrical equipment are steel sheets and bars and copper wire and cable. These materials either are available in or near Atlanta or they can be shipped to Atlanta freight prepaid.

CONCLUSION

A manufacturer of engine electrical equipment in Georgia, capitalizing on a central location and the absence of a major competitor in the area, can service customers in the Southeast more quickly and efficiently than any existing company and at the same time substantially reduce his own cost of operation.

A Georgia manufacturer producing $3 million worth of replacement engine electrical equipment annually (a 5% market penetration for southeastern consumption) can realize production labor and freight savings of $148,000 to $298,000 over manufacturers presently serving the automotive equipment distributors in the Southeast. This is equal to an additional profit on sales of between 4.9% and 9.9%.

APPENDICES

Appendix 1

CORRELATION BETWEEN THE VALUE OF SHIPMENTS
OF ENGINE ELECTRICAL EQUIPMENT AND MOTOR VEHICLE REGISTRATIONS
OF AUTOMOBILES MORE THAN THREE YEARS OLD

Year	X	Y	x (X-A)	y (Y-A)	xy	x^2	y^2
1950	454	249	-221	- 97	21437	48841	9409
1951	596	244	- 79	-102	8058	6241	10404
1952	557	273	-118	- 73	8614	13924	5329
1953	631	300	- 44	- 46	2024	1936	2116
1954	612	323	- 63	- 23	1449	3969	529
1955	746	324	71	- 22	- 1562	5041	484
1956	672	345	- 3	- 1	3	9	1
1957	723	351	48	5	240	2304	25
1958	632	377	- 43	31	- 1333	1849	961
1959	770	408	95	62	5890	9025	3844
1960	772	428	97	82	7954	9409	6724
1961	759	429	84	83	6972	7056	6889
1962	850	444	175	98	17150	30625	9604
Sum	8774	4495			82686	140229	56319
Number (N) = 13							
Average (A)	675	346					

$$\sigma_x = \sqrt{\frac{\Sigma x^2}{N}} = \sqrt{\frac{140229}{13}} = \sqrt{10789} = 104$$

$$\sigma_y = \sqrt{\frac{\Sigma y^2}{N}} = \sqrt{\frac{56319}{13}} = \sqrt{4332} = 66$$

$$\text{Coefficient: } r = \frac{\Sigma xy}{N\sigma_x\sigma_y} = \frac{82683}{13(66)(104)} = \frac{82683}{89232} = 0.93$$

X = Engine electrical equipment

Y = Registrations of automobiles more than three years old

Appendix 2

TRUCKLOAD FREIGHT RATES FOR ENGINE ELECTRICAL EQUIPMENT
(in cents per 100 pounds)

	FROM:						
TO:	Atlanta Ga.	Long Island N. Y.	Branford Conn.	Anderson Ind.	Chicago Ill.	Detroit Mich.	Toledo O.
Atlanta, Ga.	38	187*	213	152*	182	172*	172
Birmingham, Ala.	66*	201*	229	151	170	175*	172
Charlotte, N. C.	100	154*	176	159*	198	176*	175
Jacksonville, Fla.	110	198*	226	207	225	225*	216
Memphis, Tenn.	122	221*	248	134*	147	170*	166
Miami, Fla.	158	237*	270	251	270	270	260
Nashville, Tenn.	103	201*	229	119	136	147*	145

*Commodity rate

Note: Rates based on minimum truckload weight of 22,000 pounds.

If it is presumed that deliveries to these seven cities would be representative of shipments to the Southeast, average freight rates from different points of origin to the southeastern market may be obtained by multiplying each destination city's share of automotive equipment wholesale sales (Table 2) by the freight rate to that city (above) from each point of origin. The sum of these figures is the average rate to the Southeast.

AVERAGE RATES TO THE SOUTHEASTERN MARKET
(in cents per 100 pounds)

		FROM:						
TO:	Per Cent of Sales	Atlanta	Long Island	Branford	Anderson	Chicago	Detroit	Toledo
Atlanta	26	10	49	55	40	47	45	45
Birmingham	12	8	24	27	18	20	21	21
Charlotte	13	13	20	23	21	26	23	23
Jacksonville	15	17	30	34	31	34	34	32
Memphis	14	17	31	35	19	21	24	23
Miami	10	16	24	27	25	27	27	26
Nashville	10	10	20	23	12	14	15	15
Average Rate to the Southeast		91	198	224	166	189	189	185